CHAPTER 2

CASE STUDY COMMUNITIES: SKOKIE AND WILMETTE, IL

Bases of Selection of Case Study Communities

Skokie and Wilmette, IL, the two principal case study communities, were chosen for this manual primarily for three reasons, as described here. Because this manual describes case studies of a newer technology, an opportunistic approach was taken to finding principal and supplemental case study communities whose experiences could be of value to other communities. The identified case study communities in effect provided "laboratories" in which the new street storage technology could be studied.

Familiarity of the Investigators With the Projects

Each member of the four-member engineer team that conducted this investigation contributed significantly to the engineering, financing or other aspects of one or both of the two principal street storage system projects. By choosing the Skokie and Wilmette, IL as the two principal case study communities, optimum use was made of the first hand experience of the investigators.

On-Going Relationships With Personnel in the Case Study Communities

Three of the four engineer members of the team that conducted this investigation have maintained on-going relationships with personnel in at least one of the two principal case study communities. This proved to facilitate ready access to data, information, and suggestions originating within the two communities.

Opportunity to Study a Large, Long-Standing Street Storage Project

The Skokie, IL street storage system is the largest known application of this technology in the U.S. and possibly beyond. Furthermore, parts of the Skokie system have been in operation since 1983, providing many years of operating experience. By choosing Skokie for this case study, the manual captures the best known overall example of the street storage technology.

Supplemental Communities

As a supplement to using Skokie and Wilmette as the principal case study communities, other smaller scale applications of street storage, or components of it, were sought. These applications is presented in Chapter 4.

The remainder of this chapter is devoted to detailed descriptions of Skokie and Wilmette, IL. Pertinent information on supplemental communities that have implemented street storage or some aspect of it is presented when those communities are discussed.

Description of Skokie, IL

A detailed description of Skokie, IL is presented to provide context and data for understanding the case studies. Included in the description are physical attributes, meteorology, and history of CSS problems and proposed solutions to them.

Location

The general location of the 8.6 square mile Village of Skokie is shown on Figure 2-1. It is immediately north of the City of Chicago. Figure 2-2 is a map of Skokie showing major features. Skokie is bounded on the south by Lincolnwood, on the west by Niles and Morton Grove, on the north by Wilmette, and on the east by the North Shore Channel and Evanston. As suggested by Figure 2-3, which is a photo of the North Shore Channel, the channel and its associated linear parks are an amenity for area residents.

Relationship to the Metropolitan Water Reclamation District of Greater Chicago

Skokie lies entirely in the service area of the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC). At the beginning of the Skokie street storage project, this agency was named the Metropolitan Sanitary District of Greater Chicago (MSDGC).

Essentially all of Skokie is served by a CSS. Combined stormwater runoff and sanitary sewage generated within Skokie flow generally eastward to interceptors and TARP (Tunnel and Reservoir Plan), also called the deep tunnel system, which is owned and maintained by the MWRDGC. As shown schematically on Figure 2-4, the interceptor parallels the North Shore Channel. The tunnel, which parallels and lies 200 feet below the North Shore Channel, is intended to capture, via drop shafts, combined sewage that is in excess of the interceptor capacity. As suggested by Figure 2-4, the deep tunnel is primarily a pollution control system. It mitigates CSOs but has minimal impact on basement flooding caused by surcharged combined sewers.

Figure 2-1. Skokie and Wilmette, IL lie immediately north of the City of Chicago.

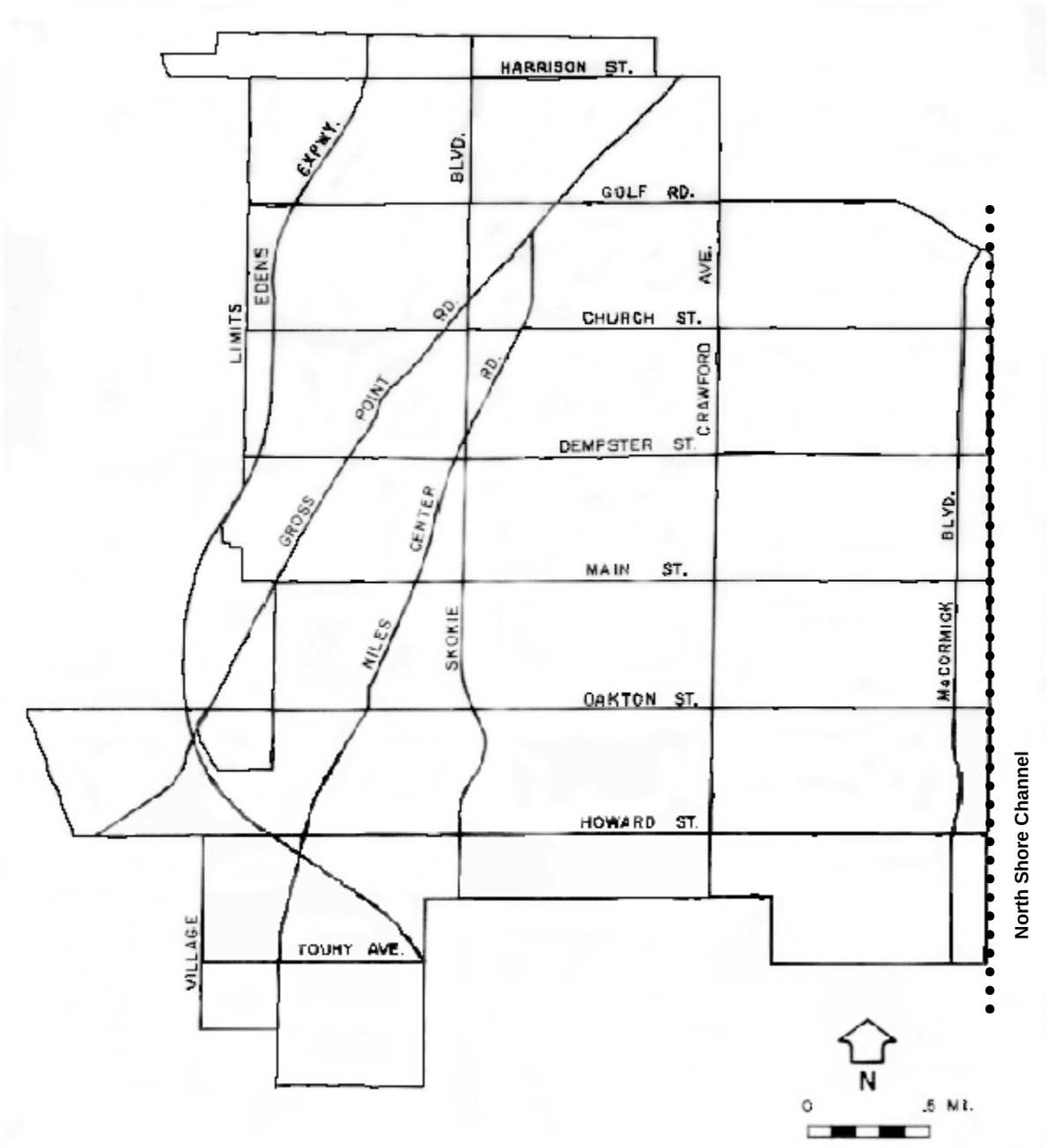

Figure 2-2. Map of Skokie, IL (Source: Donohue, 1982b, p. 13).

Figure 2-3. The North Shore Channel, which bounds Skokie on the east, and its contiguous linear parks provide an amenity for area residents.

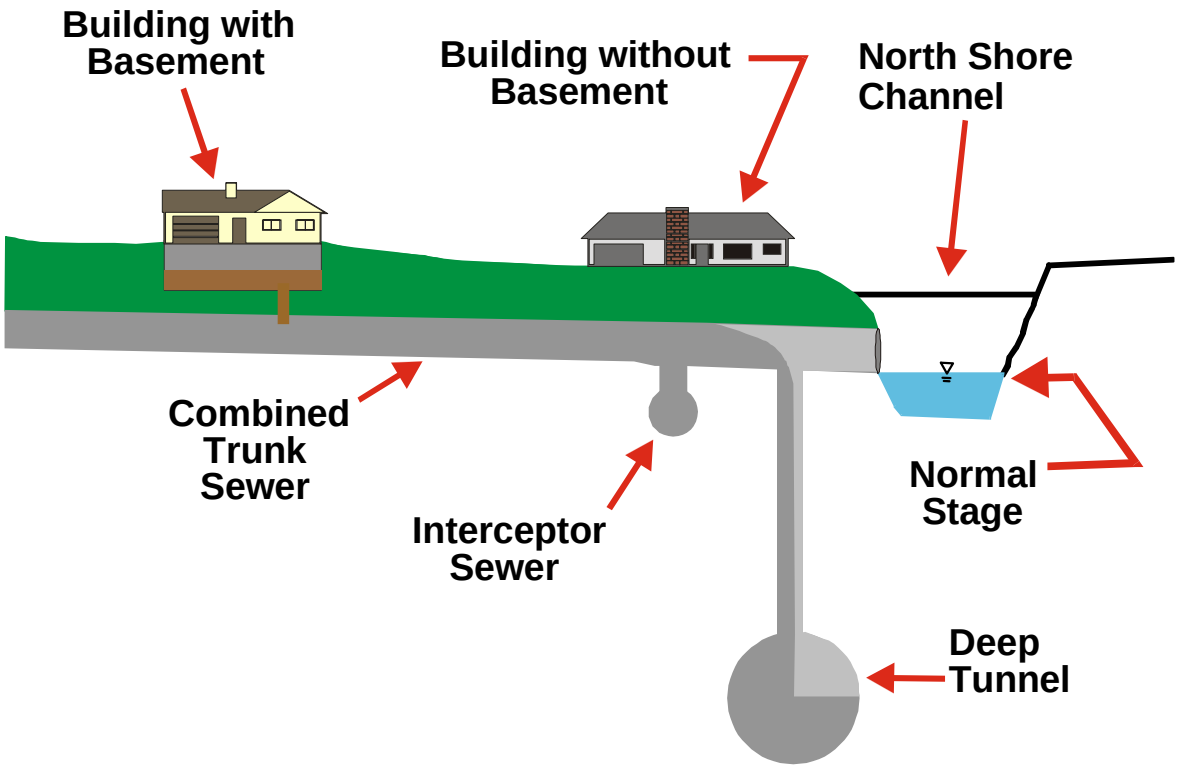

Figure 2-4. The deep tunnel is primarily a pollution control system in that it mitigates combined sewer overflows to the North Shore Channel.

Most drop shaft connections were provided to relieve the MWRDGC interceptors and not directly serve individual communities. However, proactive Chicago area communities such as Arlington Heights, Evanston, Niles, Skokie, and Wilmette were able to negotiate with the MWRDGC to provide drop shaft connections with agreed upon capacities to serve their CSSs. As a condition of placing these drop shafts, the communities were required to limit peak discharges to TARP. These conditions gave added impetus to Skokie and Wilmette, the two principal case study communities, to consider the street storage system.

Land Use and Population

Skokie is completely developed. Land use is about 80 percent residential, 10 percent industrial and 10 percent commercial. The population is about 60,000 persons with an overall population density of 11 people per acre and a population density in residential areas of approximately 14 people per acre (Nakai and Carr, 1993). There are about 20,000 single family residences in Skokie (Raasch, 1989b).

Soils and Groundwater

Skokie soils are primarily from glacial deposits of the Pleistocene series. These glacial deposits have an approximate depth of 60 feet and consist of many types of materials. About 25 percent of the community has sandy soils, while the remainder has clay soils. Groundwater levels are generally 10 to 15 feet below ground level in sandy areas. An exception is isolated perched lenses of shallower ground water (Nakai and Carr, 1993).

Topography and Drainage Patterns

“The land ...generally slopes eastward toward the North Shore Channel. Slopes vary from 0.1 to 1 percent and the overall slope in many areas of the Village is a flat 0.2 percent. Surface runoff ...flows from the front lawn and driveway areas to the street. Flow in the street is along the curb line and gutters to the nearest inlet. Inlets are generally located midblock and at intersections. Due to the extremely flat conditions, few areas have a continuous drainage pattern from block to block” (Nakai and Carr, 1993).

Trunk sewers in the combined system range in diameter from 30 inches to a maximum of 84 inches. Lateral sewers which are connected to trunk sewers vary in diameter from 12 to 27 inches. Combined sewage is carried from Skokie through three 84-inch trunk sewers to the MWRDGC interceptor sewer. When the interceptor capacity is exceeded each trunk sewer overflows first to the MWRDGC deep tunnel and then to the North Shore Channel (Nakai and Carr, 1993).

Stormwater leaves the street by flowing into an inlet, none of which have sumps, and

generally there are two inlets connected to a catch basin. As shown in Figure 2-5, catch basins are manhole-type structures containing some standing water in a sump at all times. The pipe conveying flow from the catch basin to the combined sewer is configured so as to form a trap preventing backup of sewer gases into the catch basin. Catch basins are generally located between the curb and sidewalk and have either a grated or solid manhole cover (Walesh and Schoeffmann, 1984).

Skokie is partitioned into three combined sewer districts. They are, as illustrated in Figure 2-6, the 1,255 acre Howard Street Sewer District (HSSD) in the southern part of the community; the 2,300 acre Main Street Sewer District (MSSD) in the central part, and the 1,955 acre Emerson Lake Streets Sewer District (ELSSD) in the northern part. As indicated earlier, the three districts drain generally easterly and flow into an interceptor sewer along the deep tunnel beneath the North Shore Channel (Nakai and Carr, 1993).

Climate

Skokie's climate is classified as continental, typical of a location in middle latitudes (42 degrees north latitude), but somewhat modified by the proximity of Lake Michigan which is two miles east of the community. Because of the lake, the climate is moderated relative to inland locations. Nevertheless, winters are cold, with an average snowfall of about 36 inches as snow, and summers are warm and sometimes humid. "All seasons are marked by occasionally intense storms that accompany changes from one air mass to another. Runoff from these storms, particularly in the spring and early summer, causes flooding in the Skokie area" (Donohue, 1982a, p. 29-31).

Nakai and Carr (1993) indicate that precipitation "...occurs as rain, sleet, hail, and snow and ranges from showers of trace quantities to brief intense storms to longer duration rainfall or snowfall events. Precipitation is distributed throughout the year with an average annual total of 33.3 inches." For a one-hour storm, the 1, 10, and 100-year recurrence interval rainfall amounts are 1.18, 2.10, and 3.56 inches, respectively. For a 24-hour storm, the 1, 10, and 100-year amounts are 2.51, 4.47 and 7.58 inches, respectively (Huff and Angel, 1989, pp. 29-30).

Brief History of Skokie with Emphasis on Development of Its Drainage System

Sewer surcharging and basement flooding problems that gradually developed in Skokie can be traced back to the unique circumstances associated with development of the community. Most of what is now Skokie was under waters of Lake Michigan in prehistoric times. The community lies between two ridges approximately three miles apart and the area was mostly swamp when the first explorers arrived in the sixteen hundreds and found the Potawatomi Indians living there.